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EXAMINER
RIDER, JUSTIN W

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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uspto@ti.com

DETAILED ACTION

Response to Amendment

1.   In response to the Office Action mailed 23 December 2008, applicant submitted a

response filed 23 March 2009, in which the applicant amended claim 12 to overcome the 35

U.S.C. 101 rejection without adding new matter.

Response to Arguments

2.   Applicant's arguments filed 23 March 2009 have been fully considered but they are not

persuasive. Under Section II of applicants' remarks (page 4), applicant remarks that **HE** fails to

update a scaling factor by adding a correction item based on updated information. Based on the

discussion of the speech recognition model adaptation of **HE** in the introduction, the error

minimization parameters (e.g., correction items) are clearly integrated into the previous model

scaling factors insomuch as to provide an updated model based on an adjusted covariance that

more accurately reflects the current state of a signal.

Further, with respect to applicants' remarks that updating does not take place when new

information is available, the examiner points to the Introduction paragraph of **HE** that bridges

columns 1 and 2, wherein **HE** discloses how said factors are obtained and utilized iteratively on

an utterance-by-utterance basis.

Applicants' remarks under Section III are believed to also be covered by the above

response presented by the examiner.

Claim Rejections - 35 USC § 102

3.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed
> in the United States before the invention by the applicant for patent or (2) a patent granted on an application for
> patent by another filed in the United States before the invention by the applicant for patent, except that an
> international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this
> subsection of an application filed in the United States only if the international application designated the United
> States and was published under Article 21(2) of such treaty in the English language.

4.   Claims 3-4, 6, 10 and 12 are rejected under 35 U.S.C. 102(e) as being anticipated by **He**

***et al.* 'Minimum Classification Error (MCE) Model Adaptation of Continuous Density**

HMMs' EUROSPEECH-2003, September 1-4, 2003, 1629-1632 referred to as **HE**

hereinafter.

        Claim 12: **HE** discloses a method of updating a model for speech recognition (Abstract,

The *MCELR approach is evaluated on large vocabulary speech recognition tasks.'*) comprising:

        i. adjusting a covariance associated with the model by a scaling factor to provide an

adjusted [adapted] variance (page 1631, section 4, *'Then for the* mr-*th Gaussian component*

$N(\mu_{m,r}, \Sigma_{m,r})$ *the adapted covariance is given by...'*);

        ii. updating the scaling factor [Gaussian component] based on a speech signal to be

recognized (page 1631, Section 4, *'the Gaussian component is characterized by its mean and*

covariance matrix and denoted generically as...'), wherein the speech signal is to be recognized

using the model (page 1631, Section 5.1, *'The speech recognition experiments were performed*

on...');

        iii. updating the scaling factor each time new data of the speech signal is available and

calculating a new scaling factor by adding a correction item (1. Introduction, 'parameters' as

discussed.) to a previous scaling factor (page 1631, Section 4, *'the Gaussian component is characterized by its mean and covariance matrix and denoted generically as...'* And since the component is characterized by the adaptively updated covariance, the scaling factor inherently gets updated.); and

iv. updating the model using the adjusted covariance (page 1629, Introduction describes how the main intent of the experiment is the updating [adaptation] of speech models.), wherein each step is performed by a speech recognition system (Abstract).

Claim 3: **HE** discloses a method for updating covariance of a speech signal as per claim 12 above, wherein the scaling factor is a scaling matrix (page 1631, Section 4, *'the Gaussian component is characterized by its mean and covariance <u>matrix</u> and denoted generically as...'*).

Claim 4: **HE** discloses a method for updating covariance of a speech signal as per claim 12 above, wherein the new available data of the signals is based on any length (page 1631, Section 5.1, e.g. triphones*)*.

Claim 6: **HE** discloses a method for updating covariance of a speech signal as per claim 12 above, wherein the new available data of the signals is an utterance (page 1631, Section 5.1).

Claim 10: **HE** discloses a method as per claim 3 above, wherein the scaling matrix is a diagonal matrix (page 1632, Section 5.1, *'In adaptation, diagonal transformation matrices are used for variance adaptation...'*).

Claim Rejections - 35 USC § 103

5.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6.   Claims 5, 7 and 9 rejected under 35 U.S.C. 103(a) as being unpatentable over **HE** in view of **Eberman** *et al.* **(US Patent No. 5,924,065)** referred to as **EBERMAN** hereinafter.

Claim 5: **HE** discloses a method for updating covariance of a speech signal as per claim 12 above, however failing to but **EBERMAN** does specifically disclose wherein the new available data of the signals is a frame (col. 5, lines 22-23).

Therefore, it would have been obvious to one possessing ordinary skill in the art at the time of invention to include the teachings of **EBERMAN** in the method of **HE** because it provides a way to efficiently compensate for dirty or noisy speech signals based on environmental estimations so that speech can be more naturally represented (col. 3, line 60 - col. 4, line 10).

Claim 7: **HE** discloses a method for updating covariance of a speech signal as per claim 12 above, however failing to but **EBERMAN** does specifically disclose wherein the new available data of the signals is a fixed time period (col. 5, lines 22-23, a frame inherently encompasses a fixed period of time in a frequency-domain representation.).

Therefore, it would have been obvious to one possessing ordinary skill in the art at the time of invention to include the teachings of **EBERMAN** in the method of **HE** because it provides a way to efficiently compensate for dirty or noisy speech signals based on environmental estimations so that speech can be more naturally represented (col. 3, line 60 - col. 4, line 10).

Claim 9: **HE** discloses a method for updating covariance of a speech signal as per claim 12 above, however failing to but **EBERMAN** does specifically disclose wherein the correction is the product of any sequence whose limit is zero, whose summation is infinity and whose square summation is not infinity and a summation of quantities weighted by a probability (col. 6, lines 31-34, *'In the EM process described below, an expectation step and a maximization step are iteratively performed to converge towards an optimal result during a gradient ascent;'* col. 6, lines 47-49, *'because a robust speech processing system only needs to estimate some overall parametric statistic which can be estimated from the distribution using the EM [Expectation Maximization]process.'* [emphasis supplied].

Therefore, it would have been obvious to one possessing ordinary skill in the art at the time of invention to include the teachings of **EBERMAN** in the method of **HE** because it provides a way to efficiently compensate for dirty or noisy speech signals based on environmental estimations so that speech can be more naturally represented (col. 3, line 60 - col. 4, line 10).

7.   Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over **HE** in view of **Stylianou (US Patent No. 6,266,638)** referred to as **STYLIANOU** hereinafter.

Claim 8: **HE** discloses a method as per claim 1 above, however failing to but **STYLIANOU** does, specifically disclose wherein a 10 minute segment of input speech is obtained in order to provide speech parameters (col. 3, lines 27-29, *'We have typically used between 3 and four segments (about 10 minutes of speech) for getting a good estimate of the parameters.'*).

Therefore, it would have been obvious to one having ordinary skill in the art at the time

of invention to include the teachings of **STYLIANOU** in the method of **HE** because it provides a

more comprehensive representation of input speech in order to make more accurate estimations

with respect to key speech parameters (col. 2, SUMMARY).

8.   Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over **HE** in view of

Rajan (US 2002/0026253 A1) referred to as **RAJAN** hereinafter.

Claim 11: **HE** discloses a method as per claim 1 above, however failing to specifically

disclose wherein the variance-scaling factor is exponential. However, referring back to

applicant's specification, the intent behind exponential scaling factors is to ensure positiveness

for the updated variance values (page 5, paragraph [0018]). In an analogous art, **RAJAN**

discloses a speech processing system wherein it is disclosed that variances used in updating

parameters are always positive (page 5, Paragraph [0056]).

Therefore, it would have been obvious to one possessing ordinary skill in the art at the

time of invention to include the teachings of **RAJAN** in the method of **HE** because presenting

finite values in exponential form inherently ensures a positive value and **RAJAN** discloses this

fact in implementing speech signal reconstruction processing that ensures accurate matching of

reconstructed pieces.

Conclusion

9.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to JUSTIN W. RIDER whose telephone number is (571)270-1068.

The examiner can normally be reached on Monday - Friday 6:30AM - 3:30PM.

        If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, David R. Hudspeth can be reached on (571) 272-7843. The fax phone number for

the organization where this application or proceeding is assigned is 571-273-8300.

        Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

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automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

                                        /David R Hudspeth/
                                        Supervisory Patent Examiner, Art Unit 2626

/J. W. R./
Examiner, Art Unit 2626
29 June 2009